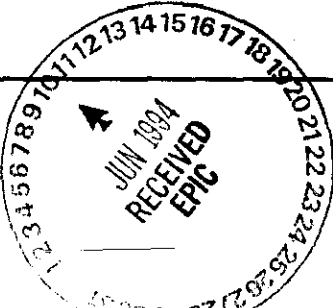


Page 1 of 1
1. EDT 606167

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) ER	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.:	6. Cog. Engr.: P. J. Valcich	7. Purchase Order No.: N/A
8. Originator Remarks: Release to record file		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: N/A
11. Receiver Remarks:		12. Major Assem. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date:

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Impact Level	Reason for Trans- mittal	Origin- ator Dispo- sition	Receiv- er Dispo- sition
1	WHC-SD-EN-TI-236		0	Data Validation Report for the 100-IU-1 Operable Unit Riverland ERA Sampling Investigation	N/A	1/2	1	
2	WHC-SD-EN-TI-235		0	Data Validation Report for the 100-IU-4 Operable Unit Sodium Dichromate Barrel ERA Investigation	N/A	1/2	1	

16. KEY		
Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 2. Release 3. Information6. Dist. (Receipt Acknow. Required) 4. Review 5. Post-Review	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)						(G)	(H)
Reason	Disp.	(J) Name	(K) Signature (M) MSIN	(L) Date	(J) Name	(K) Signature (M) MSIN	(L) Date	Reason	Disp.
1/2	1	Cog.Eng. P. J. Valcich	<i>[Signature]</i>	06/04	ERC		H6-07	3	
1/2	1	Cog. Mgr. M. J. Lauterbach	<i>[Signature]</i>	H6-01	EPIC (2)		H6-08	3	
		QA			Central Files (2)		L8-04	3	
		Safety							
		Env.							

<p>18. <u><i>F. J. Valcich</i></u> F. J. Valcich</p> <p>Signature of EDT Originator</p>	<p>19. _____ Date</p> <p>Authorized Representative Date for Receiving Organization</p>	<p>20. <u><i>M. J. Lauterbach</i></u> M. J. Lauterbach</p> <p>Cognizant/Project Engineer's Manager</p>	<p>21. DOE APPROVAL (if required) Ltr. No.</p> <p><input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments</p>
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SUPPORTING DOCUMENT

1. Total Pages **90**

2. Title

Data Validation Report for the 100-IU-4 Operable Unit Sodium Dichromate Barrel ERA Investigation

3. Number

WHC-SD-EN-TI-235

4. Rev No.

0

5. Key Words

sampling event, inorganics,
general chemical parameters**APPROVED FOR
PUBLIC RELEASE**

6. Author

Name: P. J. Valcich

P. J. Valcich 5/20/94
SignatureOrganization/Charge Code
85900/PE52B

7. Abstract

*5/31/94 D. Sells*WHC, 1994, *Data Validation Report for the 100-IU-4 Operable Unit Sodium Dichromate Barrel ERA Investigation*, WHC-SD-EN-TI-235, Rev. 0, prepared by A. T. Kearney, Inc. for Westinghouse Hanford Company, Richland, Washington.

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9. Impact Level N/A

10. RELEASE STAMP

OFFICIAL RELEASE

BY WHC

DATE JUN 02 1994

*Station # 12***11**

DISCLAIMER

This report is designated as Revision 0. The report covers a specific site for a specific sampling time frame. The report addresses only those samples that have been provided for data validation review.

----- At the request of Westinghouse Hanford Company (Westinghouse-Hanford), one hundred percent of the total number of Sample Delivery Groups received by A.T. Kearney, Inc. from the 100-IU-4 Operable Unit Sodium Dichromate Barrel ERA Investigation and their related quality assurance samples were reviewed and validated to verify that reported sample results were of sufficient quality to meet quality control objectives.

ACRONYMS

%D	Percent difference
AA	Atomic absorption
BFB	Bromofluorobenzene
BNA	Base/neutral and acid (equivalent to semivolatiles)
CCB	Continuing calibration blank
CCV	Continuing calibration verification
CLP	Contract Laboratory Program
CRA	CRDL standard for AA
CRDL	Contract required detection limit
CRI	CRDL standard for ICP
CRII	CRDL standard for ICP initial
CRIF	CRDL standard for ICP final
CRQL	Contract required quantitation limit
DBC	Dibutylchloride
DFTPP	Decafluorotriphenylphosphine
DQO	Data quality objectives
EPA	U.S. Environmental Protection Agency
GC/MS	Gas chromatography/mass spectrometry
GC	Gas chromatography
GFAA	Graphite furnace atomic absorption
ICB	Initial Calibration Blank
ICP	Inductively coupled plasma emission spectrometry
ICS	ICP interference check sample
ICV	Initial calibration verification
IDL	Instrument detection limit
LCS	Laboratory control sample
LCSS	Laboratory control sample soil
LCSW	Laboratory control sample water
MSA	Method of standard addition
MS/MSD	Matrix spike/matrix spike duplicate
NV	Not Validated
PBS	Preparation blank soil
PBW	Preparation blank water
PCB	Polychlorinated biphenyl
PEM	Performance evaluation mixture
QA	Quality assurance
QC	Quality control
RF	Response factor
RIC	Reconstructed ion chromatogram
RPD	Relative percent difference
RRF	Relative response factor
RRT	Relative retention time
RSD	Relative standard deviation
RT	Retention time
SDG	Sample delivery group
SOW	Statement of work
TAL	Target analyte list
TCL	Target compound list
TIC	Tentatively identified compounds
TOC	Total organic carbon
TOX	Total organic halides
V	Validated
VOC	Volatile organic compounds

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1.0 INTRODUCTION

The following samples were obtained from the 100-IU-4 Operable Unit Sodium Dichromate Barrel ERA Investigation sampling event:

B01971	B01978	B01985	B01992	B019B0
B01972	B01979	B01986	B01994	B019B1
B01973	B01980	B01987	B01995	B019B2
B01974	B01981	B01988	B01996	B019B3
B01975	B01982	B01989	B01997	B08XH9
B01976	B01983	B01990	B01998	
B01977	B01984	B01991	B01999	

Westinghouse-Hanford has requested that all of the Sample Delivery Groups be validated for the 100-IU-4 Operable Unit Sodium Dichromate Barrel ERA Investigation. Therefore, the data from the chemical analysis of thirty three samples from this sampling event and their related quality assurance samples were reviewed and validated to verify that reported sample results were of sufficient quality to support decisions regarding remedial actions performed at this site. Sample number B01993, although included on the sample list was never submitted with any data packages. Therefore, A.T. Kearney was requested by Westinghouse-Hanford to submit the 100-IU-4 Sodium Dichromate Barrel ERA Investigation, report without this sample. Sample number B01980 was used to identify two samples. It was requested by Westinghouse-Hanford that sample B01980 sampled on 4/8/93 be changed to B08HX9. The samples were analyzed by Thermo-Analytic Laboratories (TMA) and Roy F. Weston Laboratories (WESTON) using U.S. Environmental Protection Agency (EPA) CLP protocols.

Sample analyses included:

- Inorganics
- General chemical parameters.

The table below lists the Sample Delivery Groups (SDGs) that were validated for this sampling event. The validated data are included in this report.

SDG No.	Matrix	No. of Samples Analyzed	Parameters
B01971	S	9	Inorganics, Wet Chem
B01978	S	1	Inorganics, Wet Chem
B01990	S	1	Inorganics, Wet Chem
B01994	S	9	Inorganics, Wet Chem
B019B0	S	1	Inorganics, Wet Chem
B08XH9	S	12	Inorganics, Wet Chem

Thirty three samples were validated for radiochemical parameters by TMA and Teledyne. Analytical protocols specified in the *Westinghouse Hanford Company Statement of Work for Nonradioactive Inorganic/Organic and Radiochemical Analytical Services* were used. Sample analyses included the following:

- Gamma spectroscopy

SDG No.	Matrix	No. of Samples Analyzed	Parameters
B01971	S	9	Radiochemistry
B01978	S	1	Radiochemistry
B01990	S	1	Radiochemistry
B01994	S	9	Radiochemistry
B019B0	S	1	Radiochemistry
B08XH9	S	12	Radiochemistry

The radiochemical data summary tables can be found following Section 4.8.

Data quality was reviewed and analytical results validated using Westinghouse-Hanford procedures and related EPA CLP protocols and guidelines. Data were qualified based upon their quality and the guidance provided by these sources. In instances where the two protocols differed, the Westinghouse-Hanford guidance was followed.

Three sets of split samples were submitted to WESTON Laboratories as shown below:

Set 1:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Location</u>
B01976	B01978	IU-4 Test Pit E6

Set 2:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Location</u>
B01988	B01990	IU-4 Test Pit C6

Set 3:

<u>Sample No.</u>	<u>Split Sample No.</u>	<u>Location</u>
B01998	B019B0	IU-4 Test Pit G4

The split sample results for the well locations were included in the validated data. The results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. The results fell within the required control limit. All results for the well locations appear in the summary tables within the report.

Three sets of field duplicate samples were submitted to TMA as shown below:

Set 1:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Location</u>
B01976	B01977	IU-4 Test Pit E6

Set 2:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Location</u>
B01988	B01989	IU-4 Test Pit C6

Set 3:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>	<u>Location</u>
B01998	B01999	IU-4 Test Pit G4

The field duplicate sample results for the well locations were included in the validated data. The results were compared using the sample guidelines for determining the RPD between a sample and its duplicate. The results fell within the required control limit. All results for the well locations appear in the summary tables within this report.

Four equipment blanks were submitted to TMA. The equipment blanks are identified as follows: B01971, B01980, B01994 and B08XH9, and were collected on 3/31/93, 4/02/93, 4/13/93 and 4/08/93 respectively.

Under EPA protocol, equipment blanks are water samples used to indicate whether or not decontamination procedures were adequate or that contamination was not inherent in the equipment used. The equipment blank information provided was inadequate to determine what contamination, if any, was a result of the equipment used. Equipment blanks require location identifiers and associated sample numbers in order to make such a determination.

The report is broken down into sections for each chemical analysis and radiochemical analysis type. Each section addresses the data package completeness, holding time adherence, instrument calibration and tuning acceptability, blank results, accuracy, precision, system performance, as well as the compound identification and quantitation. In addition, each section has an overall assessment and summary for the data packages reviewed for the particular chemical/radiochemical analyses. Detailed backup information is provided to the reader by SDG No. and sample number. For each data package, a matrix of chemical analyses per sample number is presented, as well as data qualification summaries.

Laboratory and data validation personnel added qualifiers to the reported data based on specified data quality objectives. The data reporting qualifiers are summarized as follows:

- U - Indicates the analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for dilutions and moisture content. It should be noted that the sample quantitation limit may be higher or lower than the contract or method required detection limit, depending on instrumentation, matrix and concentration factors.
- J - Indicates the analyte was analyzed for and detected. However, the associated value is considered to be an estimate due to identified QC deficiencies. Data flagged with a "J" may be usable for decision making purposes, depending upon the DQOs of the project. Laboratories qualify all reported organic detects below CRQL with a "J" per the CLP procedures.
- UJ - Indicates the analyte was analyzed for and not detected. However, the associated detection limit is considered to be an estimate due to identified QC deficiencies. Detection limits flagged with a "UJ" may be usable for decision making purposes, depending upon the DQOs of the project.

JN - Indicates the analyte was analyzed for and that there is presumptive evidence of the presence of the compound. The concentration reported is considered an estimate which should be used for informational purposes only.

R - Indicates the analyte was analyzed for and due to a significant QC deficiency, the data are deemed unusable. Analytic results flagged "R" are invalid and provide no information as to whether or not the analyte is present.

It should be noted that, frequently, results will bear two qualifiers - one given by the laboratory and one given during the validation process. For example, a "U" qualifier is given by the laboratory when the compound has not been detected during the analysis, and a "J" qualifier may be added during the validation to qualify the result due to minor quality problems. Therefore, the resulting qualification is "UJ", where the "U" qualifier has been given by the laboratory and the "J" qualifier given by the validator.

The results of data validation performed for the 100-IU-4 Operable Unit Sodium Dichromate Barrel ERA Investigation are contained in the tables following each of the chapters in this report.

Several general quality trends which resulted in data qualification were observed. These included:

- Two sets of percent solids for each sample were used to calculate ICP and GFAA final results in two data packages. No explanation was provided by TMA Laboratory in their case narrative. Westinghouse-Hanford should address this issue with the laboratory.
- Selenium calibration correlation coefficients were less than 0.995 for three analysis runs. All associated results were qualified as estimates and flagged "J".
- Minor laboratory blank contamination was noted in the inorganics analysis. Associated results were flagged accordingly.
- The metals analysis showed minor matrix spike accuracy problems, analytical spike recoveries below the QC limits; laboratory duplicate RPD results outside of QC limits; and ICP serial dilution results outside of QC limits. Therefore, several metals results were flagged "J" due to these factors.
- GFAA analytical spikes were not performed for arsenic, lead, selenium and thallium in one data package. This is a significant deviation from the CLP protocol. All associated results were qualified as estimates and flagged "J".

- Hexavalent chromium soil sample holding times were exceeded in three data packages. All associated results were qualified as estimates and flagged "J".
- The matrix spike recovery fell outside the QC limits in one hexavalent chromium data package. All associated results were qualified as estimates and flagged "J".
- Due to lack of continuing calibration information, all gamma spectroscopy results were rejected "R".
- Due to lack of an annual calibration for Liquid Marinelli Detector #3, results in three data packages were rejected "R".
- All gamma spectroscopy results were qualified as estimates and flagged "J" due to the continuing calibration check source not being identified by nuclide and activity. The "J" qualifier was, however, superseded by the "R" qualifier as described above.

In general, the protocol-specific QA/QC requirements were met for the samples analyzed in this investigation with the exceptions noted above and discussed in detail in the chapters to follow. All requested analyses were performed.

With the exceptions noted above, the protocol-specific data quality objectives in terms of precision, accuracy, completeness, representativeness, and comparability have been met.

LOCATION AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
Test Pit E2	B01972	S	04/02/93	V	2-11
Test Pit E3	B01973	S	04/02/93	V	2-11
Test Pit E4	B01974	S	04/02/93	V	2-11
Test Pit E5	B01975	S	04/02/93	V	2-11
Test Pit E6	B01976	S	04/02/93	V	2-11
	B01977	S	04/02/93	V	2-11
	B01978	S	04/02/93	V	2-16
Test Pit E1	B01979	S	04/02/93	V	2-11
Test Pit D1	B01981	S	04/08/93	V	2-34
Test Pit D2	B01982	S	04/08/93	V	2-34
Test Pit C1	B01983	S	04/08/93	V	2-34
Test Pit C2	B01984	S	04/08/93	V	2-34
Test Pit C3	B01985	S	04/08/93	V	2-34
Test Pit C4	B01986	S	04/08/93	V	2-34
Test Pit C5	B01987	S	04/08/93	V	2-34
Test Pit C6	B01988	S	04/08/93	V	2-34
	B01989	S	04/08/93	V	2-34
	B01990	S	04/08/93	V	2-20
Test Pit C7	B01991	S	04/08/93	V	2-35
Test Pit C8	B01992	S	04/08/93	V	2-35
Test Pit G1	B01995	S	04/13/93	V	2-24
Test Pit G2	B01996	S	04/13/93	V	2-24
Test Pit G3	B01997	S	04/13/93	V	2-24
Test Pit G4	B01998	S	04/13/93	V	2-24
	B01999	S	04/13/93	V	2-24
	B019B0	S	04/13/93	V	2-30
Test Pit G5	B019B1	S	04/13/93	V	2-24
Test Pit G6	B019B2	S	04/13/93	V	2-24
Test Pit G7	B019B3	S	04/13/93	V	2-24

LOCATION AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	INORGANICS
EB	B01971	S	03/31/93	V	2-11
	B01980	S	04/02/93	V	2-11
	B01994	S	04/13/93	V	2-24
	B08XH9	S	04/02/93	V	2-34

2.0 INORGANIC DATA VALIDATION

2.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and checked for completeness:

B01971	B01990	B019B0
B01978	B01994	B08XH9

2.2 HOLDING TIMES

Analytical holding times for ICP metals and GFAA metals were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: samples must be analyzed within six months for all ICP and GFAA metals.

All holding time requirements for all analytes in all data packages reviewed were met.

2.3 INSTRUMENT PERFORMANCE AND CALIBRATIONS

Performance of specific instrument quality assurance and quality control procedures, including deficiencies noted during the quality assurance review, are outlined below.

Three calibration standards and a blank were analyzed for arsenic, lead, selenium and thallium by GFAA. The correlation coefficient of a least squares linear regression met the requirements for calibration in most cases.

The calibration correlation coefficient for three selenium analyses was <0.995. Although laboratory instrument printouts showed the correlation coefficients to be >0.995, results were recalculated and verified to be at 0.9923, 0.9940 and 0.9907 respectively. In accordance with Westinghouse-Hanford Data Validation Guidelines, all associated results for selenium were flagged as estimates "J" in the following samples.

- All samples in SDG No. B01971.
- Sample numbers B01995, B01997, B01998, B0199B1, B0199B2 and B0199B3 in SDG. No. B01994.
- Sample numbers B08XH9, B01981, B01983, B01984, B01985, B01986, B01987, B01988, B01989, B01991 and B01992 in SDG. No. B08XH9.

At least one standard and a blank were analyzed by ICP for all other elements.

The above calibrations were each immediately verified with an ICV standard and a calibration blank. The ICV was prepared from a source independent of the calibration standards, at a mid-calibration range concentration. The ICV percent recovery must fall within the control limits of 90 to 110 percent for metals analyzed by ICP and GFAA. Calibration linearity near the detection limit was verified with a standard prepared at a concentration near the CRDL.

The ICVs met the recommended control limits in all cases.

The calibrations were subsequently verified at regular intervals using a CCV standard. The control windows for percent recovery of CCV standards are the same as the ICV windows described above.

The CCVs met the recommended control limits in all cases.

2.3.1 ICP Calibration

An ICS was analyzed at the beginning and end of each ICP sample run to verify the laboratory interelement and background correction factors. Results for the ICS solution must fall within the control limit of ± 20 percent of the true value.

The ICS has been analyzed at the proper frequency and all ICSAB solution percent recovery values fell within the control limit.

2.3.2 Atomic Absorption Calibrations

Duplicate injections are required for all GFAA analyses. The duplicate injections establish the precision of the individual analytical determinations. For sample concentrations greater than the CRDL, duplicate injections must agree within ± 20 percent RSD or CV. The AA calibration results are discussed further in Section 2.7 of this report.

2.4 BLANKS

2.4.1 Positive Blank Results

Samples with digestate concentrations (in ug/L) of less than five times ($< 5x$) the highest amount found in any of the associated blanks have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times ($> 5x$) the highest amount found in any of the associated blanks do not require qualification.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for barium:

- Sample number B08XH9 in SDG No. B08XH9.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for beryllium:

- Sample numbers B01981, B01982, B01983, B01984, B01985, B01986, B01987, B01988, B01989, B01991 and B01992 in SDG No. B08XH9.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for calcium:

- Sample number B01980 in SDG No. B01971.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for copper:

- Sample numbers B08XH9, B01984, B01986, B01987, B01988, B01989, B01991 and B01992 in SDG No. B08XH9.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for lead:

- Sample number B01994 in SDG No. B01994.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for magnesium:

- Sample number B08XH9 in SDG No. B08XH9.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for manganese:

- Sample number B08XH9 in SDG No. B08XH9.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for potassium:

- Sample number B08XH9 in SDG No. B08XH9.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for sodium:

- Sample number B08XH9 in SDG No. B08XH9.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for vanadium:

- Sample number B08XH9 in SDG No. B08XH9.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for zinc:

- Sample number B08XH9 in SDG No. B08XH9.
- Sample number B01994 in SDG No. B01994.

All other laboratory blank results were acceptable.

2.4.2 Negative Blank Results

In the case of negative blank results, if the absolute value of any calibration blank exceeds the IDL, all non-detects are qualified as estimates and flagged "J", and all positive results within two times the absolute value of the blank result are qualified as estimates and flagged "J". In the case of preparation blanks, if the absolute value exceeds the CRDL, all non-detects are rejected and flagged "R" and all detected values that are less than ten times the absolute value of the preparation blank result are qualified as estimates and flagged "J".

Due to a negative calibration blank result greater than two times the sample result, the following samples were flagged "J" for thallium:

- Sample numbers B01972, B01973, B01974 and B01975 in SDG No. B01971.

No other negative blank results were detected.

2.5 ACCURACY

2.5.1 Matrix Spike Recovery

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must generally fall within the range of 75 to 125 percent. Samples with a spike recovery of less than 30% and a sample value below the IDL were rejected and flagged "R". All other samples with a spike recovery outside the QC limits are qualified as estimates and flagged "J".

The matrix spike recovery fell outside the QC limits and the associated results were flagged "J" for antimony in the following samples:

- Sample number B01978 in SDG No. B01978.
- Sample number B01990 in SDG No. B01990.
- All samples in SDG No. B01994.
- All samples in SDG No. B08XH9.

The matrix spike recovery fell outside the QC limits and the associated results were flagged "J" for lead in the following samples:

- Sample number B01978 in SDG No. B01978.
- Sample number B019B0 in SDG No. B019B0.

The matrix spike recovery fell outside the QC limits and the associated results were flagged "J" for selenium in the following samples:

- All samples in SDG No. B01994.

All other matrix spike recovery results were acceptable.

2.5.2 Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be digested or distilled and analyzed with every group of samples which have been prepared together. Sample recoveries less than 50% were rejected and flagged "R". All other samples with LCS recovery outside of QC limits are qualified as estimates and flagged "J".

One solid LCS was digested and analyzed for each of the cases in this report that contained soil samples. The results were compared against the established performance criteria and found to be acceptable.

LCS solid samples for soil samples digested and analyzed by WESTON could not be verified as actual solid samples. According to the WESTON digestion logbooks, two milliliters of ICV were used for the LCS. However, according to Exhibit E, Section V, Item 8 (pg. E-19) of the USEPA Statement of Work for Inorganics Analysis, Document Number ILM01.0, the ICV can only be used as the LCS for the digestion and analysis of aqueous samples. A solid LCS provided by the EPA or a certified agent is required for soil samples.

All LCS results were found to be acceptable.

2.6 PRECISION

2.6.1 Laboratory Duplicate Samples

The laboratory duplicate results measures the precision of the method by measuring a second aliquot of the sample that is treated the same way as the original. Samples whose precision fell outside the quality control requirements were flagged as estimates "J".

All laboratory duplicate recovery results were acceptable.

2.6.2 ICP Serial Dilution

The ICP serial dilution is used to determine whether significant physical or chemical interferences exist due to sample matrix. If sample concentration is ≥ 50 times the IDL for an analyte and the %D is outside the control limits the associated data must be qualified as estimates "J".

The ICP serial dilution result fell outside the QC limits and the associated result was flagged "J" for barium in the following samples:

- Sample number B01978 in SDG No. B01978.

The ICP serial dilution result fell outside the QC limits and the associated results were flagged "J" for zinc in the following samples:

- Sample number B01978 in SDG No. B01978.
- All Samples in SDG No. B01994.
- Sample number B01990 in SDG No. B01990.
- Sample number B019B0 in SDG No. B019B0.

All other ICP serial dilution results were acceptable.

2.7 FURNACE AA QUALITY CONTROL

The post-digestion analytical spike is analyzed to determine the extent of interference in the digestate matrix. When the results of the analytical spike analyses exceeds the control window of 85 to 115 percent recovery and the absorbance of the sample is greater than fifty percent of the analytical spike absorbance, then the sample must be reanalyzed using the MSA. The duplicate injections and the analytical spike recoveries establish the precision and accuracy of the individual GFAA determinations.

2.7.1 Duplicate Injections

Each furnace analysis requires a minimum of two injections (burns), except for full MSA. For concentrations greater than CRDL, the duplicate injection readings must agree within 20% RSD or CV. If these requirements are not met, the analytical sample must be rerun once (i.e., two additional burns). If the readings are then still outside the QC limits, the result is qualified as an estimate and flagged "J".

All duplicate injection quality control requirements were met.

2.7.2 Analytical Spike Recoveries

For all samples whose analytical spike results are outside the 85 to 115 percent control limit, but whose absorbances are less than 50 percent of the analytical spike absorbance, the samples were flagged as estimates "J". In cases where the analytical spike recovery was 0.0 percent, the results were rejected and flagged "R".

The analytical spike recovery fell outside the established QC limits and the associated result was flagged "J" for selenium in the following sample:

- Sample number B01981 in SDG No. B08XH9.

Under the CLP 3/90 SOW for Inorganics, GFAA analysis requires that an analytical spike be run immediately following the associated sample and the percent recovery calculated to determine further action. The analytical spike was not performed for any of the GFAA metals in SDG No. B01990, therefore sample results for arsenic, lead, selenium and thallium in sample number B01990 were qualified as estimates and flagged "J".

All other analytical spike recovery results were acceptable.

2.7.3 Method of Standard Addition Results

For all samples whose analytical spike results are outside the 85 to 115 percent control limit and whose absorbances are greater than 50 percent of the analytical spike absorbance an MSA is required. In cases where the MSA correlation coefficient was less than 0.995 the MSA analysis was repeated once. If the correlation coefficient was still less than 0.995, samples were flagged as estimates "J".

All MSA results were acceptable.

2.8 ANALYTE QUANTITATION AND DETECTION LIMITS

Twenty percent of sample results and reported detection limits were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors.

The reviewer verified that the results and detection limits fell within the linear range of the instrument.

2.9 OVERALL ASSESSMENT AND SUMMARY

All samples were analyzed and reported under the 1990 CLP protocol (EPA 1990). Several inconsistencies and deviations from the protocol were observed. They are as follows:

A CCV and CCB must be analyzed immediately after the ICV and ICB. ICAP analysis does not follow this protocol. For ICAP analysis a CCV and CCB were run after the initial interference checks and CRI. This is incorrect because the ICSA/AB and CRII are considered analytical samples and according to the CLP protocol a CCV and CCB must be run prior to any analytical samples.

Internal Chains of Custody lacked sufficient information such as interdepartmental transfers, i.e., from the sample custodian to the technician responsible for sample preparation and the dates these transfers took place plus the EPA sample ID number. Without this information Internal Chains of Custody can not be verified as those belonging to samples in this report. Refer to Sections F-5, paragraph 1.5 and F-3, paragraph 1.4 of the EPA CLP SOW 3/90 protocol.

Percent solids for samples in SDG Nos. B01971 and B08XH9 submitted by TMA Laboratories were determined twice on two separate days. The percent recoveries determined on the first day were used to calculate final results from ICP analysis and percent recoveries determined on the second day were used to calculate final results from GFAA analysis. In several cases significant differences were noted between the two determinations. Below is a table of all samples which have two percent solids results. In accordance with Westinghouse-Hanford Data Validation Guidelines no action was taken to qualify samples based upon this discrepancy, however Westinghouse-Hanford should contact TMA for an explanation in order to determine the percent solids results' acceptability.

<u>Sample</u>	<u>% Solids 4/12/93</u>	<u>% Solids 5/11/93</u>
B01971	92.7	97.0
B01972	93.9	99.2
B01973	90.4	96.2
B01974	94.1	99.2

B01975	88.8	96.2
B01976	91.8	97.6
B01977	90.8	87.6
B01980	99.8	100.0

<u>Sample</u>	<u>% Solids 4/20/93</u>	<u>% Solids 5/11/93</u>
B08XH9	93.4	100.0
B01981	91.0	95.9
B01982	91.7	96.5
B01983	91.4	96.2
B01984	91.8	97.1
B01985	89.2	94.1
B01986	89.4	94.8
B01987	90.1	94.3
B01988	89.9	95.0
B01989	89.6	90.2
B01991	92.3	93.1
B01992	92.2	92.6

For samples analyzed by WESTON, incorrect ICP instrument detection limits (IDL's) are being used to report results down to the IDL. Two sets of IDL's (Form 10) are included in the data package for ICAP analysis, one for instrument IC1 and one for instrument IC3. According to the case narrative addendum, WESTON states that the highest IDL of the two instruments is used, as per Exhibit E, Section V, Item 10 (pg. E-53) of the EPA Statement of Work for Inorganics Analysis, Document Number ILM01.0. This is correct only when two instruments are being used to determine sample results within a data package. However, in this data package WESTON used only one ICP instrument to determine the sample results and therefore it is that instrument's IDL's which should be used to calculate results. According to the raw data and the Form XIV information IC1 is the instrument being used for analysis while some of the IDL's of IC3 are the ones reported on Forms 1-9. This can effect results flagged "U" or results which may be flagged "U" because of laboratory blank contamination. Results have been changed, where necessary, to reflect results based on IDLs from instrument IC1.

LCS solid samples for soil samples digested and analyzed by WESTON could not be verified as actual solid samples. According to the WESTON digestion logbooks, two milliliters of ICV were used for the LCS. However, according to Exhibit E, Section V, Item 8 (pg. E-19) of the USEPA Statement of Work for Inorganics Analysis, Document Number ILM01.0, the ICV can only be used as the LCS for the digestion and analysis of aqueous samples. A solid LCS provided by the EPA or a certified agent is required for soil samples.

All raw data associated with WESTON has not been labeled with the client (EPA) ID number. Results labeled with only the laboratory sample ID number is insufficient. Refer to Section B-10 of the EPA CLP SOW 3/90.

Except as noted in the preceding sections, all other validated data are usable for all purposes.

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B01971																			
Sample Number		B01971		B01972		B01973		B01974		B01975		B01976		B01977		B01979		B01980			
Location		EB		TPE2		TPE3		TPE4		TPE5		TPE6		TPE6		TPE1		EB			
Remarks		EQP.Blank												Duplicate				EQP.Blank			
Sample Date		3/31/93		4/02/93		4/02/93		4/02/93		4/02/93		4/02/93		4/02/93		4/02/93		4/02/93			
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	5750		7090		6910		6530		6510		6300		6600		6430		48.4			
Antimony	60	4.1	U	4.0	U	3.9	U	3.9	U	4.0	U	4.0	U	4.1	U	3.9	U	3.7	U		
Arsenic	10	2.9		1.4		2.8		2.2		1.5		2.1		2.4		2.0		0.48	U		
Barium	200	73.3		89.4		89.7		80.9		67.3		64.3		73.1		66.3		0.51			
Beryllium	5	0.19	U	0.19		0.18	U	0.26		0.19	U	0.19	U	0.19	U	0.19	U	0.18	U		
Cadmium	5	0.30	U	0.30	U	0.29	U	0.29	U	0.29	U	0.29	U	0.30	U	0.29	U	0.27	U		
Calcium	5000	3540		6020		6860		9750		4860		3930		4380		6340		36.7	U		
Chromium	10	86.7		12.1		11.3		11.4		13.9		16.6		16.5		11.0		0.82	U		
Cobalt	50	7.4		9.3		9.5		8.3		8.0		7.4		8.0		8.5		0.62	U		
Copper	25	9.9		12.4		13.2		12.0		11.9		12.1		11.7		11.7		0.95	U		
Iron	100	17800		18600		18100		16400		16400		15900		16900		16900		452			
Lead	3	17.8		3.9		4.3		4.2		3.8		4.0		4.3		3.3		0.34			
Magnesium	5000	3540		4970		5420		5050		4450		4290		4490		4880		12.8	U		
Manganese	15	286		313		330		306		275		275		277		275		0.80			
Mercury	0.2	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A			
Nickel	40	8.3		10.6		11.1		10.3		9.8		10.2		10.3		11.6		1.1	U		
Potassium	5000	1630		1470		1540		1390		1300		1260		1280		1250		24.1	U		
Selenium	5	0.66	UJ	0.65	UJ	0.69	UJ	0.64	UJ	0.67	UJ	0.65	UJ	0.74	UJ	0.66	UJ	0.63	UJ		
Silver	10	0.99	U	0.98	U	0.94	U	0.94	U	0.97	U	0.96	U	0.99	U	0.95	U	0.90	U		
Sodium	5000	184		262		285		234		228		239		261		267		49.0			
Thallium	10	0.54	U	0.53	UJ	0.56	UJ	0.52	UJ	0.54	UJ	0.53	U	0.60	U	0.54	U	0.52	U		
Vanadium	50	31.3		41.7		37.0		33.3		39.2		35.6		38.9		38.9		0.78	U		
Zinc	20	44.0		45.3		45.9		41.7		46.9		69.1		55.2		41.9		4.5			
Cyanide	10	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A			

EB=Equipment Blank, TP=Test Pit, N/A=Not Applicable

BLANK AND SAMPLE DATA SUMMARY

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----- DATA QUALIFICATION SUMMARY

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Page__1__ of__1__

TP=Test Pit, N/A=Not Applicable

ACCURACY DATA SUMMARY

SDG: B01978	REVIEWER: PG	DATE: 1/10/94	PAGE <u>1</u> OF <u>1</u>	
COMMENTS:				
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED
B01978S	Antimony	65.8	B01978	J
B01978S	Lead	54.5	B01978	J

PRECISION DATA SUMMARY

2-18

DATA QUALIFICATION SUMMARY

ACCURACY DATA SUMMARY

SDG: B01990	REVIEWER: PG	DATE: 1/6/94	PAGE <u>1</u> OF <u>1</u>	
COMMENTS:				
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED
B01990S	Antimony	57.5	B01990	J
B01990A	Arsenic	Analytical Spike not performed	B01990	J
B01990A	Lead	Analytical Spike not performed	B01990	J
B01990A	Selenium	Analytical Spike not performed	B01990	J
B01990A	Thallium	Analytical Spike not performed	B01990	J

9413274-0346

PRECISION DATA SUMMARY

SDG: B01990	REVIEWER: PG	DATE: 1/6/94	PAGE <u>1</u> OF <u>1</u>		
COMMENTS:					
COMPOUND	SAMPLE ID:	SAMPLE ID:	RPD	SAMPLES AFFECTED	QUALIFIER
Zinc	B01990	B01990L	14.7	B01990	J

DATA QUALIFICATION SUMMARY

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9413274.0348

INORGANIC ANALYSIS, SOIL MATRIX, (mg/Kg)

Page 1 of 1

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B01994																			
Sample Number		B01994		B01995		B01996		B01997		B01998		B01999		B019B1		B019B2		B019B3			
Location		EB		TPG1		TPG2		TPG3		TPG4		TPG4		TPG5		TPG6		TPG7			
Remarks		EQP. Blank										Duplicate									
Sample Date		4/13/93		4/13/93		4/13/93		4/13/93		4/13/93		4/13/93		4/13/93		4/13/93		4/13/93			
Inorganic Analytes	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	54.3		6850		6020		7220		6790		6330		6760		6880		7110			
Antimony	60	3.5	UJ	3.9	UJ	3.6	UJ	3.8	UJ	3.9	UJ	3.9	UJ	3.7	UJ	3.6	UJ	3.5	UJ		
Arsenic	10	0.49	U	2.1		2.1		2.0		1.5		2.2		1.9		1.8		1.9			
Barium	200	0.49	U	67.8		69.1		72.0		73.3		74.9		68.3		70.0		76.9			
Beryllium	5	0.10	U	0.34		0.31		0.33		0.33		0.34		0.32		0.33		0.32			
Cadmium	5	0.33	U	0.37	U	0.34	U	0.36	U	0.37	U	0.37	U	0.35	U	0.34	U	0.33	U		
Calcium	5000	29.4		4110		3870		4230		3670		3570		4030		3900		4320			
Chromium	10	1.1	U	15.1		18.8		13.2		23.8		31.2		16.9		15.2		10.2			
Cobalt	50	0.75	U	8.7		8.1		8.2		8.0		11.1		8.1		8.3		8.5			
Copper	25	0.83	U	11.8		10.6		12.0		11.1		13.4		11.5		12.8		11.2			
Iron	100	122		17000		15900		16800		16400		32800		16300		16900		17400			
Lead	3	0.31	U	4.5		4.3		4.7		4.5		5.2		5.9		4.1		4.3			
Magnesium	5000	9.1	U	4110		3740		4190		3950		3820		3990		3950		4460			
Manganese	15	0.41		291		272		314		292		342		290		283		304			
Mercury	0.2	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A			
Nickel	40	1.2	U	10.4		9.1		10.4		9.9		11.9		8.9		10.2		10.8			
Potassium	5000	36.9	U	1380		1270		1480		1630		1570		1420		1330		1450			
Selenium	5	1.0	J	0.70	UJ	0.70	UJ	0.72	UJ	0.73	UJ	0.74	UJ	0.7	UJ	0.72	UJ	0.70	UJ		
Silver	10	0.75	U	0.83	U	1.1		0.80	U	0.98		2.5		0.94		1.2		0.81			
Sodium	5000	24.7		195		170		181		163		158		181		170		171			
Thallium	10	0.24	U	0.25	U	0.25	U	0.26	U	0.26	U	0.27	U	0.26	U	0.26	U	0.25	U		
Vanadium	50	0.65	U	37.0		33.6		36.3		33.5		35.4		34.8		38.5		38.8			
Zinc	20	6.6	UJ	45.8	J	37.4	J	50.6	J	40.5	J	39.3	J	42.5	J	41.8	J	39.9	J		
Cyanide	10	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A			

TP=Test Pit, EB=Equipment Blank, N/A=Not Applicable

WHC-SD-EN-TI-235, Rev. 0

CALIBRATION DATA SUMMARY

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BLANK AND SAMPLE DATA SUMMARY

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ACCURACY DATA SUMMARY

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9413274.0352

PRECISION DATA SUMMARY

SDG: B01994	REVIEWER: PG	DATE: 1/13/94	PAGE <u>1</u> OF <u>1</u>		
COMMENTS:					
COMPOUND	SAMPLE ID:	SAMPLE ID:	%D	SAMPLES AFFECTED	QUALIFIER
Zinc	B019B3	B019B3L	42.1	All	J

[illegible]

TP=Test Pit, N/A=Not Applicable

WHC-SD-EN-TI-235, Rev. 0

ACCURACY DATA SUMMARY

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100-443887-100

PRECISION DATA SUMMARY

[illegible]

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B08XH9																			
Sample Number		B08XH9		B01981		B01982		B01983		B01984		B01985		B01986		B01987		B01988		B01989	
Location		EB		TPD1		TPD2		TPC1		TPC2		TPC3		TPC4		TPC5		TPC6		TPC6	
Remarks		EQP. Blank																		Duplicate	
Sample Date		4/08/93		4/08/93		4/08/93		4/08/93		4/08/93		4/08/93		4/08/93		4/08/93		4/08/93		4/08/93	
Inorganic Analytes	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	50.1		8360		8160		8010		7070		7800		6930		6660		7170		7620	
Antimony	60	3.8	UJ	3.9	UJ	3.9	UJ	3.8	UJ	3.9	UJ	4.1	UJ	3.9	UJ	3.8	UJ	4.1	UJ	4.1	UJ
Arsenic	10	0.45	U	3.1		2.5		2.5		2.1		2.8		2.5		2.3		2.3		2.4	
Barium	200	0.3	U	142		89.3		89.2		72.0		81.5		75.8		68.3		69.0		77.1	
Beryllium	5	0.06	U	0.30	U	0.32	U	0.28	U	0.27	U	0.34	U	0.30	U	0.31	U	0.26	U	0.28	U
Cadmium	5	0.29	U	0.30	U	0.29	U	0.29	U	0.29	U	0.31	U	0.29	U	0.29	U	0.31	U	0.31	U
Calcium	5000	19.3	U	4320		4450		5890		4550		4570		4470		4460		7030		4780	
Chromium	10	0.68	U	29.6		16.4		16.8		16.5		16.2		11.6		15.6		17.1		17.7	
Cobalt	50	0.60	U	18.3		9.2		8.7		8		8.6		7.6		7.5		7.8		7.8	
Copper	25	2.3	U	144		31.4		37.5		17.9	U	20.7		15	U	13.0	U	13.8	U	12.7	U
Iron	100	256		61800		20300		21200		17600		19700		16100		16000		16800		17300	
Lead	3	0.33		58.7		17.5		18.3		9.1		11.7		8.2		16.8		5.0		5.2	
Magnesium	5000	6.0	U	4400		4670		4550		4310		4340		4120		4150		4300		4450	
Manganese	15	0.25	U	592		345		328		277		307		283		269		269		279	
Mercury	0.2	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Nickel	40	0.86	U	42.2		12.8		13.3		10.4		11.3		9.6		10.1		10.3		11.2	
Potassium	5000	23.8	U	1690		1730		1560		1520		1590		1540		1470		1560		1620	
Selenium	5	0.64	UJ	0.67	UJ	0.90	U	0.67	UJ	0.67	UJ	0.69	UJ	0.66	UJ	0.69	UJ	0.65	UJ	0.71	UJ
Silver	10	0.68	U	4.5		0.85		1.3		0.86		0.73		0.68	U	0.678	U	0.73	U	0.72	U
Sodium	5000	15.6	U	910		196		382		236		263		254		195		213		227	
Thallium	10	0.50	U	0.53	U	0.51	U	0.53	U	0.53	U	0.55	U	0.52	U	0.55	U	0.51	U	0.56	U
Vanadium	50	0.44	U	37.6		40.8		40.5		37.1		39.9		35.3		34.9		38.5		38.1	
Zinc	20	2.9	U	247		90.3		145		61.6		83.4		50.7		46.0		38.1		38.1	
Cyanide	10	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A	
													</								

WHC-SD-EN-TI-235, Rev. 0

EB=Equipment Blank, TP=Test Pit, N/A=Not Applicable

INORGANIC ANALYSIS, SOIL MATRIX, (mg/Kg)

Page 2 of 2

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B08XH9																			
Sample Number		B01991		B01992																	
Location		TPC7		TPC8																	
Remarks																					
Sample Date		4/08/93		4/08/93																	
Inorganic Analytes	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	6120		7720																	
Antimony	60	4.0	UJ	3.9	UJ																
Arsenic	10	2.2		2.2																	
Barium	200	61.3		75.0																	
Beryllium	5	0.26	U	0.32	U																
Cadmium	5	0.30	U	0.29	U																
Calcium	5000	5200		5190																	
Chromium	10	10.0		12.3																	
Cobalt	50	7.4		8.3																	
Copper	25	11.9	U	12.1	U																
Iron	100	15200		18200																	
Lead	3	3.4		4.2																	
Magnesium	5000	4290		4310																	
Manganese	15	250		286																	
Mercury	0.2	N/A		N/A																	
Nickel	40	10.2		10.5																	
Potassium	5000	1210		1640																	
Selenium	5	0.68	UJ	0.68	UJ																
Silver	10	0.71	U	0.70	U																
Sodium	5000	202		270																	
Thallium	10	0.53	U	0.53	U																
Vanadium	50	35.8		40.0																	
Zinc	20	35.1		36.4																	
Cyanide	10	N/A		N/A																	

BLANK AND SAMPLE DATA SUMMARY

SDG: B08XH9		REVIEWER: MH			DATE: 1/11/94			PAGE 1 OF 1	
COMMENTS:									
SAMPLE ID	COMPOUND	RESULT	Q	RT	UNITS	5X RESULT	10X RESULT	SAMPLES AFFECTED	QUALIFIER
CCB	Barium	1.5			ug/L	7.5	15	B08XH9	U
CCB	Beryllium	.5			ug/L	2.5	5	B01981, B01982, B01983, B01984, B01985, B01986, B01987, B01988, B01989, B01991, B01992	U
ICB	Copper	17.4			ug/L	87	174	B08XH9, B01984, B01986, B01987, B01988, B01989, B01991, B01992	U
CCB	Magnesium	38.6			ug/L	193	386	B08XH9	U
CCB	Manganese	1.7			ug/L	8.5	17	B08XH9	U
PBS	Potassium	99.6			ug/L	498	996	B08XH9	U
PBS	Sodium	109			ug/L	545	1090	B08XH9	U
ICB	Vanadium	3.0			ug/L	15	30	B08XH9	U
PBS	Zinc	14.1			ug/L	70.5	141	B08XH9	U

ACCURACY DATA SUMMARY

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DATA QUALIFICATION SUMMARY

SDG: B08XH9	REVIEWER: MH	DATE: 1/20/94	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Selenium	J	B08XH9, B01981, B01983, B01984, B01985, B01986, B01987, B01988, B01989, B01991, B01992	Corr. Coeff. <0.995
Barium	U	B08XH9	Lab Blank Contamination
Beryllium	U	B01981, B01982, B01983, B01984, B01985, B01986, B01987, B01988, B01989, B01991, B01992	Lab Blank Contamination
Copper	U	B08XH9, B01984, B01986, B01987, B01988, B01989, B01991, B01992	Lab Blank Contamination
Magnesium	U	B08XH9	Lab Blank Contamination
Manganese	U	B08XH9	Lab Blank Contamination
Potassium	U	B08XH9	Lab Blank Contamination
Sodium	U	B08XH9	Lab Blank Contamination
Vanadium	U	B08XH9	Lab Blank Contamination
Zinc	U	B08XH9	Lab Blank Contamination
Antimony	J	All	Matrix Spike
Selenium	J	B01981	GFAA Analytical Spike

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LOCATION AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	WET CHEMISTRY
Test Pit E2	B01972	S	04/02/93	V	3-4
Test Pit E3	B01973	S	04/02/93	V	3-4
Test Pit E4	B01974	S	04/02/93	V	3-4
Test Pit E5	B01975	S	04/02/93	V	3-4
Test Pit E6	B01976	S	04/02/93	V	3-4
	B01977	S	04/02/93	V	3-4
	B01978	S	04/02/93	V	3-9
Test Pit E1	B01979	S	04/02/93	V	3-4
Test Pit D1	B01981	S	04/08/93	V	3-15
Test Pit D2	B01982	S	04/08/93	V	3-15
Test Pit C1	B01983	S	04/08/93	V	3-15
Test Pit C2	B01984	S	04/08/93	V	3-15
Test Pit C3	B01985	S	04/08/93	V	3-15
Test Pit C4	B01986	S	04/08/93	V	3-15
Test Pit C5	B01987	S	04/08/93	V	3-15
Test Pit C6	B01988	S	04/08/93	V	3-15
	B01989	S	04/08/93	V	3-15
	B01990	S	04/08/93	V	3-10
Test Pit C7	B01991	S	04/08/93	V	3-16
Test Pit C8	B01992	S	04/08/93	V	3-16
Test Pit G1	B01995	S	04/13/93	V	3-11
Test Pit G2	B01996	S	04/13/93	V	3-11
Test Pit G3	B01997	S	04/13/93	V	3-11
Test Pit G4	B01998	S	04/13/93	V	3-11
	B01999	S	04/13/93	V	3-11
	B019B0	S	04/13/93	V	3-14
Test Pit G5	B019B1	S	04/13/93	V	3-11
Test Pit G6	B019B2	S	04/13/93	V	3-11
Test Pit G7	B019B3	S	04/13/93	V	3-11

LOCATION AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	WET CHEMISTRY
EB	B01971	S	03/31/93	V	3-4
	B01980	S	04/02/93	V	3-4
	B01994	S	04/13/93	V	3-11
	B08XH9	S	04/02/93	V	3-15

3.0 WET CHEMISTRY DATA VALIDATION

3.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B01971
B01978

B01990
B01994

B019B0
B08XH9

3.2 HOLDING TIMES

Analytical holding times for hexavalent chromium were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are 24 hours for aqueous samples.

Although no specific holding times exist for soil samples, results that grossly exceeded the 24 hour holding time limit were qualified as estimates "J".

Holding times were exceeded for hexavalent chromium in SDG Nos. B01971, B01978, B01990, B01994, B019B0 and B08XH9. All associated sample results were qualified as estimates and flagged "J".

3.3 CALIBRATIONS

3.3.1 Initial Calibration

The following calibration procedures must be conducted:

- At least a blank and three standards were used to establish the ion chromatography, ion selective electrode, spectrophotometer, calibrations prior to sample analysis and the correlation was ≥ 0.995 .

All initial calibration results were acceptable.

3.3.2 Continuing Calibration Verification

All CCV standards must be analyzed with the required frequency or every 20 samples. The percent recoveries must fall within the 90-110% acceptance windows.

The CCV for analytical run dated 4/16/93 exceeded the 110% acceptance limit, however in accordance with Westinghouse-Hanford Data Validation Guidelines, no qualification was required because all sample results were less than the IDL.

All other continuing calibration results were acceptable.

3.4 BLANKS

One laboratory preparation blank is analyzed at a frequency of one every 20 samples. All blank results must fall below the CRQL and if not, all associated data <5 times the amount found in the blank is qualified as non-detected and flagged "U".

All laboratory blank results were acceptable.

3.5 ACCURACY

3.5.1 Matrix Spike Recovery

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must generally fall within the range of 75 to 125 percent. Samples with a spike recovery of less than 30% and a sample value below the IDL were rejected and flagged "R". All other samples with a spike recovery outside the QC limits are qualified as estimates and flagged "J".

The matrix spike recovery fell outside the QC limits and the associated results were flagged "J" for hexavalent chromium in the following samples:

- All samples in SDG No. B01971.

All other matrix spike results were acceptable.

3.5.2 Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be prepared (e.g., digested or distilled) and analyzed with every group of samples which have been prepared together. The performance criteria for solid LCS samples are established through

interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier).

All LCS results were found to be acceptable.

3.6 PRECISION

Analytical duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Field duplicate analyses are used to measure both the laboratory and the field sampling procedure precision.

All duplicate analyses results were acceptable for this data.

3.7 ANALYTE QUANTITATION AND DETECTION LIMITS

Sample results and reported detection limits were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors. In addition, the reviewer verified that the results fell within the linear range of the instrument.

3.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicate that instrument performance was adequate for all analyses. The holding times for hexavalent chromium for all samples in three data packages were exceeded and all associated results were qualified as estimates and flagged "J". The matrix spike percent recovery was exceeded for all samples in one data package and all associated results were qualified as estimates and flagged "J". Results that are qualified as estimates are usable for limited purposes. All other QC results are considered accurate within the standard error associated with the methods.

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EB=Equipment Blank, TP=Test Pit, N/A=Not Applicable

HOLDING TIME SUMMARY

SDG: B01971		REVIEWER: LM			DATE: 1/21/94		PAGE 1 OF 1	
COMMENTS:								
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER	
B01971	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	
B01972	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	
B01973	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	
B01974	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	
B01975	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	
B01976	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	
B01977	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	
B01979	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	
B01980	Hex. Chromium	4/02/93	4/15/93	4/16/93		24 Hours	J	

CALIBRATION DATA SUMMARY

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ACCURACY DATA SUMMARY

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3-8

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HOLDING TIME SUMMARY

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HOLDING TIME SUMMARY

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1. The first part of the document is a list of names and addresses, which appears to be a directory or a list of contacts. The names are written in a cursive script, and the addresses are listed below them. The list includes names such as "J. H. Smith", "W. J. Jones", and "A. B. Brown", among others.

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EB=Equipment Blank, TP=Test Pit

HOLDING TIME SUMMARY

SDG: B01994	REVIEWER: PG		DATE: 1/14/94	PAGE <u>1</u> OF <u>1</u>			
COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B01994	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J
B01995	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J
B01996	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J
B01997	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J
B01998	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J
B01999	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J
B019B1	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J
B019B2	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J
B019B3	Hex. Chromium	4/13/93	4/23/93	4/26/93		24 Hours	J

3-13

HOLDING TIME SUMMARY

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EB=Equipment Blank, TP=Test Pit, N/A=Not Applicable

HOLDING TIME SUMMARY

SDG: B08XH9		REVIEWER: LM		DATE: 1/21/94		PAGE 1 OF 1	
COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B08XH9	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01981	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01982	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01983	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01984	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01985	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01986	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01987	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01988	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01989	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01991	Hex. Chromium	4/8/93		4/26/93		24 Hours	J
B01992	Hex. Chromium	4/8/93		4/26/93		24 Hours	J

LOCATION AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	RADIOCHEMISTRY
Test Pit E2	B01972	S	04/02/93	V	4-4
Test Pit E3	B01973	S	04/02/93	V	4-4
Test Pit E4	B01974	S	04/02/93	V	4-4
Test Pit E5	B01975	S	04/02/93	V	4-4
Test Pit E6	B01976	S	04/02/93	V	4-4
	B01977	S	04/02/93	V	4-4
	B01978	S	04/02/93	V	4-5
Test Pit E1	B01979	S	04/02/93	V	4-4
Test Pit D1	B01981	S	04/08/93	V	4-9
Test Pit D2	B01982	S	04/08/93	V	4-9
Test Pit C1	B01983	S	04/08/93	V	4-9
Test Pit C2	B01984	S	04/08/93	V	4-9
Test Pit C3	B01985	S	04/08/93	V	4-9
Test Pit C4	B01986	S	04/08/93	V	4-9
Test Pit C5	B01987	S	04/08/93	V	4-9
Test Pit C6	B01988	S	04/08/93	V	4-9
	B01989	S	04/08/93	V	4-9
	B01990	S	04/08/93	V	4-6
Test Pit C7	B01991	S	04/08/93	V	4-10
Test Pit C8	B01992	S	04/08/93	V	4-10
Test Pit G1	B01995	S	04/13/93	V	4-7
Test Pit G2	B01996	S	04/13/93	V	4-7
Test Pit G3	B01997	S	04/13/93	V	4-7
Test Pit G4	B01998	S	04/13/93	V	4-7
	B01999	S	04/13/93	V	4-7
	B019B0	S	04/13/93	V	4-8
Test Pit G5	B019B1	S	04/13/93	V	4-7
Test Pit G6	B019B2	S	04/13/93	V	4-7
Test Pit G7	B019B3	S	04/13/93	V	4-7

LOCATION AND SAMPLE INFORMATION					SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	NV/V	RADIOCHEMISTRY
EB	B01971	S	03/31/93	V	4-4
	B01980	S	04/02/93	V	4-4
	B01994	S	04/13/93	V	4-7
	B08XH9	S	04/02/93	V	4-9

4.0 GAMMA SPECTROSCOPY DATA VALIDATION

4.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

-----B01971-----B01978-----B01990-----B01994-----B019B0-----B08XH9

4.2 HOLDING TIMES

Holding times are calculated from Chains-of-Custody to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

4.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the gamma spectroscopy system used is capable of producing acceptable and reliable analytical data. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument efficiency determination for each gamma radionuclide region of interest, and a system resolution assessment as measured by the full-width at half maximum for each peak. Initial calibration was performed for each counting geometry used during the analysis of Westinghouse-Hanford samples. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible.

Due to a lack of daily check source counts and weekly background counts before and after sample analysis, all gamma results in all SDGs were rejected. Due to a lack of annual calibration data for Gamma Spectroscopy Liquid Marinelli Detector #3, results for the following samples were rejected "R": B01972, B01975 and B01979 in SDG No. B01971; B01981, B01984, B01987 and B01991 in SDG No. B08XH9; B01995, B01997, B019B1 and B019B3 in SDG No. B01994. All gamma sample results were qualified as estimated and flagged "J" due to the continuing calibration check source not being identified by nuclide and activity.

4.4 ACCURACY

Accuracy was evaluated by analyzing soil or distilled water samples spiked with known amounts of gamma emitting

radionuclides. The sample activity as determined by sample analysis is compared to the known activity to assess accuracy. The acceptable spiked recovery range is 80 to 120 percent. If spiked sample results were outside this range the associated data are qualified as estimated "J/UJ".

All accuracy results were acceptable.

4.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. A duplicate with a RPD less than 35 percent is acceptable. If sample and duplicate activities are both $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If sample and duplicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects "J" or estimated non-detects "UJ".

All precision results were acceptable.

4.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results may be due to field and/or laboratory contamination.

Due to blank contamination, all Thorium-228 results in SDG Nos. B01978 and B01990 were qualified as estimated and flagged "J".

All other blank results were acceptable.

4.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitations and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

All analyte quantitation and reported detection limits were acceptable.

4.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicates that instrument performance was inadequate for these analyses. Due to a lack of continuing calibration information, all gamma results in all SDGs were rejected. Due to the lack of an annual calibration for Liquid Marinelli Detector

#3, all results in three SDGs were rejected. All validated sample results in all SDGs were qualified as estimated and flagged "J" due to the continuing calibration check source not being identified by nuclide and activity. Data qualified as estimated is valid and usable for limited purposes only. Rejected data is invalid and unusable for any purpose.

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1657-1728-16

4-4

EB = Equipment Blank, TP = Test Pit, DUP = Duplicate, N/D = Not Detected

4-5

TP = Test Pit

4-6

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4-7

EB = Equipment Blank, TP = Test Pit, DUF = Duplicate, N/D = Not Detected

[illegible]

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4-9

EB = Equipment Blank, TP = Test Pit, DUP = Duplicate, N/D = Not Detected


9403274-0401

Project: WESTINGHOUSE-HANFORD																									
Laboratory: TMA																									
Case		SDG: B08XH9																							
Sample Number		B01991				B01992																			
Location		TPC7				TPC8																			
Remarks																									
Sample Date		04/08/93				04/08/93																			
Radiochemistry Analytes		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q				
Potassium-40		14	R	13	R																				
Iron-59		N/D	R	N/D	R																				
Chromium-51		N/D	R	N/D	R																				
Cobalt-60		N/D	R	N/D	R																				
Zinc-65		N/D	R	N/D	R																				
Ruthenium-106		N/D	R	N/D	R																				
Cesium-134		N/D	R	N/D	R																				
Cesium-137		N/D	R	N/D	R																				
Cerium-144		N/D	R	N/D	R																				
Europium-152		N/D	R	N/D	R																				
Europium-154		N/D	R	N/D	R																				
Radium-226		0.51	R	0.58	R																				
Thorium-228		0.68	R	1.0	R																				
Thorium-232		0.75	R	0.84	R																				

5.0 REFERENCES

- EPA, 1987, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, Environmental Protection Agency, Washington, D.C.
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- WHC, 1992b, *Data Validation Procedure for Radiological Analyses*, WHC-SD-EN-SPP-001, Revision 0, Westinghouse Hanford Company, 1991.

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				Impact Level N/A	
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M. J. Lauterbach		5/20/94		Date Cancelled	
				Date Disapproved	

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